Single Prick Method for the Detection of Blood Analytes
Technology #17472

Applications

Measuring analytes in the blood forms a substantial component of medical diagnostics, ranging from critical-care to point-of-care testing. This Raman-based technique facilitates the detection of slight deviations in biomarker concentrations correlated with abnormal body function. Such non-invasive continuous measurements are extremely valuable for measuring blood glucose levels in diabetic patients, as there is no need for multiple blood draws per day. Additionally, this method could allow for more effective screenings for pre-diabetes and gestational diabetes, or aid in neonatal and ICU patient monitoring.

Problem Addressed

A measurement system must be calibrated before it can quantify the concentration of analytes in a blood sample. State-of-the-art calibration methods employ spectroscopy, which can yield noisy results and have trouble obtaining data from a dynamically changing sample. Traditional attempts to solve these problems with spectroscopy require training data from multiple non-continuous spectroscopy “gold standard” measurements. This results in an over-trained model that cannot be applied generally between samples. In a clinical setting, these traditional methods require drawing small quantities of blood with each measurement, which often compromises the measurement system calibration due to sample perturbation and sample-to-sample variability. Thus, there is a need for a non-invasive calibration method that requires minimal “gold standard” measurements, allows for the continuous measurement of analytes within an individual, and does not compromise the sample.

Technology

This analytical framework utilizes non-invasive, continuous Raman spectroscopy measurements, and a kinetic model to calibrate the measurement system necessary to quantify the concentration of analytes within a sample. The framework does not need a priori training data from traditional “gold standard” measurements in order to develop a calibration model. Rather, it calculates sample concentration information, equivalent to training data, by utilizing the initial spectroscopy measurement and the concentration profiles generated from the system kinetic model. This combination of inputs allows the frameworks to predict the concentration information of a dynamic sample over time, such as when glucose samples are taken immediately after meal ingestion.

Advantages

- Continuous monitoring of concentration information
- Non-invasive
- Obtain concentration information without perturbing the sample
- No need for a chemical reaction for concentration information
Categories For This Invention:
Medical Devices
Diagnostic
Therapeutic (Medical Devices)
Clinical Applications
Blood Disorder

Intellectual Property:
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Publications:
Spectroscopic Approach for Dynamic Bioanalyte Tracking with Minimal Concentration Information
Scientific Reports
November 12, 2014, Volume 4, p. 7013

External Links:
Laser Biomedical Research Center
http://lbrc.mit.edu/

Image Gallery:
Figure 1: A schematic illustration of the Raman spectroscopic measurement process for in vivo continuous glucose monitoring.